Morbidity and mortality in children are mainly due to preventable diseases such as measles, poliomyelitis, tuberculosis, whooping cough, diphtheria, and tetanus (Lee, 2005). Despite increase in global immunization coverage, many children around the world especially in developing countries are left unimmunized. In 2007, approximately 27 million infants worldwide were unimmunized against common childhood diseases and 2-3 million children die of vaccine preventable diseases (WHO, 2010). Globally, immunization coverage has increased during the past decade to levels of around 78% for diphtheria–tetanus–pertussis-3 (DTP-3), but in African Regions including Nigeria, it is about 69% (CDC, 2010).

From International comparative data, Nigeria's immunization coverage rates are among the worst in the world (UNICEF, 2001). It was revealed that only 13 per cent of children had received all the vaccines by age 12 months and 17 per cent had received them by age 23 months as at 2003 (NPC & Macro, 2009). Also, about 38 per cent of children in Nigeria had not received any vaccinations. When compared with result from the 1990 NDHS, it revealed that proportion of children less than 23 months that were vaccinated against childhood diseases has declined from 30 per cent (1990 NDHS) to a low value of 17 per cent (1999 NDHS). However by 1999, Expanded Programme on Immunization (EPI) data showed that BCG coverage declined to 13 per cent and DPT3 coverage declined to 19 Per cent. Although this decline was for all types of vaccines, it was greater for DPT and polio than for BCG and measles (1999 MICS).

There are studies that have been conducted to see the levels of vaccination uptake in the Nigeria. (Babalola, 2011; Odusanya et al., 2008; Ayebo and Eregie, 2009). However these studies do not identify the determinants of full childhood vaccination in a representative sample of the entire Nigeria population. Furthermore, most of the studies merely looked at selected vaccine such as BCG or DPT 1, 2 or 3 to represent full immunization. In this study, all the required vaccines for a child would be assessed. Also, previous studies done in Nigeria

have been particularly limited to local geographic regions, states or localities. No study has been conducted on full child immunization which we can apply to the country as a whole.

Identifying the factors that determine full child immunization at the national level will thereby enable the government to provide programmes environment through well-articulated policies, projects and programmes like National Immunisation Policy and Standards of Practice. This is to ensure healthy growth of children in Nigeria and enhance their quality of life. It can also gain a perception on how to improve upon current National Programme on Immunization in Nigeria.

Methodology

This study made use of the 2008 Nigeria Demographic Health Survey (NDHS) children data. According to the study report, data on immunization were collected from vaccination cards and in cases where these were not available or a vaccination was not recorded on the card, the mother's recall of vaccination was accepted. During the 2008 survey, 33,385 women aged 15-49 were interviewed and 24,358 under-5 children were recorded for the women.

The study population for this study comprised 4,520 living children (aged 12-23 months) delivered by 4,520 women aged 15-49 years 5years before the survey.

Binary logistic regression was performed to identify determinants of full immunization status.

Result: Out of the 4,520 eligible children aged 12–23 months that were analyzed, about 981 (22%) had received full immunization. The most significant determinants of full child immunization were found at several levels and these include place of delivery, antenatal care mother's occupation, mother's education, wealth, region, age of mother, residence and Religion.

Adjusted Odd ratio of determinants of full child immunization among 12-23 months old in Nigeria, 2008.

CHARACTERISTICS OF THE MOTHER	ODD RATIOS (OR)	P>value	CONFIDENCE INTERVAL (95%)
Region			
South west	RC(1.00)		
North Central	1.05	0.74	0.80-1.36
North East	0.56***	0.00	0.41-0.78
North West	0.49***	0.00	0.34-0.69
South East	1.15	0.35	0.85-1.56
South south	0.95	0.71	0.71-1.26
Education			
No education	RC(1.00)		
Primary education	1.41**	0.01	1.09-1.82
Secondary and Higher	1.87***	0.00	1.42-2.46
Age of mother			
15-24	RC(1.00)		
25-34	1.22	0.10	0.96-1.55
35-44	1.25	0.20	0.89-1.75
45+	1.82*	0.05	0.99-3.35
Occupation			
Not working	RC(1.00)		
Professional, technical, manager	1.62*	0.03	1.04-2.54
Clerical and service	1.45	0.06	0.98-2.15
Sales, agric-employee, skilled and unskilled	1.15	0.19	0.93-1.41
Residence			
Urban	RC(1.00)		
Rural	0.98	0.84	0.80-1.20
Marital Status			
Never married	RC(1.00)		
Currently married	0.79	0.37	0.48-1.32
Formerly married	0.91	0.81	0.43-1.92
Wealth status			
Poor	RC(1.00)		
Middle	1.34**	0.02	1.05-1.71
Rich	1.69***	0.00	1.31-2.19
Religion			
Christian	RC(1.00)		
Islam	0.54***	0.00	0.43-0.68
Other	0.48	0.08	0.22-1.08
CHARACTERISTICS OF THE CHILD			
Sex			
Male	RC(1.00)		
Female	1.09	0.31	0.92-1.29

Birth order			
1	RC(1.00)		
2-3	1.01	0.93	0.79-1.30
4-5	0.98	0.92	0.73-1.32
6+	0.98	0.90	0.68-1.40
ACCESS TO HEALTH FACILITY			
Distance to health Facility			
Big problem	RC(1.00)		
Not a problem	1.38***	0.00	1.14-1.66
Place of delivery			
Non health facility	RC(1.00)		
Health facility	1.76***	0.00	1.45-2.13
Antenatal care			
No antenatal	RC(1.00)		
Less than 4 times	2.09***	0.00	1.54-2.83
4 times and above	3.22***	0.00	2.57-4.04

***p<0.05**

DISCUSSION

This study tried to identify the determinants of full child immunization among children aged between 12-23 months old in Nigeria. This was done by using the vaccination card and maternal recall. Based on immunization card and recall, 22% of the children were fully immunized against childhood diseases. Comparing the immunization level of children between aged 12-23 months in Nigeria with NDHS 2003, the percentage of fully vaccinated is higher by 10%. It is higher than the national immunization coverage survey that reported only 18% of children aged 12-23 months that were fully immunized as at 2006.

The mother's level of education had a significant positive influence on the odds of the child being fully immunized. Children born to parents with primary level of education are more likely to receive full immunization (Adjusted odd ratio [AOR=1.41]) than children born to mothers with no education, while children born to mothers with secondary and higher are two times more likely to receive full immunization than children of mothers with no education [AOR=1.87]. This finding is consistent with other literatures like Tadesse et al., 2009 and Breiman et al., 2004, that found that maternal education was a significant predictor of

completeness of immunization because highly educated mothers will be more aware of the importance of immunization. The role of maternal education as an important cause of immunization uptake has also been shown by Mahy, 2003 and Onyiriuka, 2005. In contrast, in study conducted in Libya by Mabrouka and Bofarraj in 2011, there was no significant relationship between immunization status and mothers' educational level.

The mother's age also had a positive influence on the odds of the child being fully immunized. Children of mothers aged 45 and above are more likely to be fully immunized [AOR=1.82] compared to children born to mothers aged 15-24. This could be because elder mothers know the effect and the importance of immunization on children than young women. This finding is the same with the study conducted in Sudan by Ibnouf et al., 2007 and also in the study conducted in Nigeria by Babalola 2009.

In this study, it was also found that wealth has a positive association with full child immunization. This means the higher the wealth status of the mother, the more likely it is for the child to be fully immunized. Children that belong to the wealthiest households have improved vaccination outcomes. Children born to the middle class parents are likely to receive full immunization [AOR=1.82] compared to children born to the poor in Nigeria. Children born to rich parents are more likely to be fully vaccinated [AOR=1.69]. Children belong to wealthier households may be more likely to have their vaccination status checked and to receive missing doses of vaccines when attending a health care facility than children from poor households. Also it could be because children who are from poor homes find it difficult to be reached by the health workers and also parents may encounter barriers to reach health facility compared to rich children. In the study conducted by Castro-Leal, 1999 and Pande, 2003, they found no association between wealth status and full child immunization.

Children from North-east region were less likely [AOR=0.56] to receive full immunization compared to children from South west region of Nigeria. Also children in North-west region were also less likely to be fully immunized compared to children in the South west region [AOR=0.49]. The six regions in Nigeria consist of different religious, population size and levels of development. These regional differences tend to affect the range of child immunization campaign effectiveness across the country (Antai, 2009) and which could be linked with differences in vaccine supply between areas within the different regions.

A strong association between full immunization and religion was shown in this study. Children born by Muslim parents were less likely to receive full immunization compared to children born by Christian parents [AOR=0.54]. However, this is consistent with the result of the research conducted in Nigeria by Babalola 2009. Misconception by Muslims affects the immunization uptake in Northern Nigeria.

Evidence of a strong statistical association was also found in place of delivery and Full immunization. Result showed that child born in health facilities were more likely to receive full immunization compared to those that were delivered at non health facilities like home [AOR=1.76]. The same was found in the study conducted in Niger Delta area of Nigeria by Oyo-Ita et al., 2012. A child that is born in a health facility would have more access to immunization than a child born at a non health facility. At birth, a child is given Polio 0 and this makes the parent to be aware of immunization. Similar findings have been reported in previous studies (Luman et al., 2005 and Oladokun et al., 2009).

Substantial evidence of a strong association between antenatal care and full immunization was also found. Likelihood of full immunization uptake increases with number of ANC visits by the mother. Children whose mother attended antenatal less than four times were more likely to receive full immunization compared to children whose mother did not attend any ANC. [AOR=2.09]. In the same way, children born to mothers who attended ANC four times

or more were more likely to receive full immunization [AOR=3.22]. This could be true because antenatal clinic is a mean for women to be aware of immunization programme (Mutua et al., 2011.). This is consistent with the finding in the research conducted by Adedayo et al., 2009 that showed that about 65% of the women got their awareness of immunization at the antenatal clinics.

Distance to the health facility strongly influenced the immunization status of a child. Children born to mother who think distance to health facility is not a problem were more likely to receive Full immunization compared to mother who think it is a big problem [AOR =1.38]. This was the same with the findings in the study conducted in Kenya by Mutual et al., 2011 and in India by Takum et al., 2011 and in Nigeria by Adedayo et al., 2009. This may be because parents may not be willing to walk long distances due to regular absence of health workers or unavailability of vaccine at the health facility. Another explanation could be visibility of health facility may act as a reminder to the parent.

In this binomial logistic regression analysis, the sex of the child, birth order, marital status, place of residence (urban/ rural), were not associated with full immunization status.

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